to provide a display of the condition of the fuel cell as well as signals indicating if a further hydrogen supply cartridge **13** is required or the time remaining in the one presently being used.

Although the particular embodiment as shown in FIGS. **2** to **4** describes the fuel cell stand-by supply system **10** of the present invention in association with a forced air furnace, such a system may be adapted to all sorts of electrically operated devices such as hot water heaters, lighting systems, alarm systems, and a multitude of other devices. Also, although the fuel cells as hereinshown are supplied by hydrogen cartridges **13**, it is conceivable that the hydrogen may be supplied by a supply line fed by a hydrogen producing system or by other supplies or directly by hydrocarbon, methane or methanol.

It is within the ambit of the present invention to cover any obvious modifications of the preferred embodiment described herein, provided such modifications fall within the scope of the appended claims.

We claim:

1. A fuel cell stand-by energy supply system for supplying electrical power to a device operated by power from an electrical utility in the event of a power failure, said stand-by energy supply system comprising detection means for detecting a power failure, control circuit means for monitoring said detection means and one or more conditions of said device, said control circuit means operating a fuel cell switch to connect a fuel cell or an integration fuel cell and battery d.c. supply directly or to a voltage conditioning circuit to produce an operative a.c. supply and for connecting said a.c. supply to said device to continue operation thereof during said power failure, said control circuit means having power sensing means and means to control the operation of said device so as to maximize the use of the power available in said fuel cell.

2. A fuel cell stand-by energy supply system as claimed in claim **1** wherein said control circuit means is a microcontroller.

3. A fuel cell stand-by energy supply system as claimed in claim **2** wherein said device is an electrically operated fossil fuel forced air furnace or hot water heater, said device having a heat producing element and an electrically operated multi-speed blower motor, burner and controls.

4. A fuel cell stand-by energy supply system as claimed in claim **3** wherein said heat producing element is supplied electric power through a first switch means, said electrically operated multi-speed blower having a speed control switch through which the speed of said motor is controlled.

5. A fuel cell stand-by energy supply system as claimed in claim **4** wherein said furnace is provided with a temperature sensing probe connected to said microcontroller and providing a signal representative of temperature, said microcontroller operating said speed control switch to control the energy consumption of said blower motor relative to the remaining energy capacity of said fuel cell d.c. supply feeding said voltage conditioning circuit.

6. A fuel cell stand-by energy supply system as claimed in claim **5** wherein said speed control switch is a multi position switch to operate said blower at one of available selected speeds to control the energy consumption from said operating a.c. supply of said voltage conditioning circuit fed by said fuel cell.

7. A fuel cell stand-by energy supply system as claimed in claim **5** wherein said furnace control switch means is automatically operated by a thermostat which monitors ambient temperature in a building enclosure whereby to connect power from said fuel cell d.c. supply to said heat producing element when the temperature in said building enclosure falls below a preset value of said thermostat.

8. A fuel cell stand-by energy supply system as claimed in claim **7** wherein said heat producing element is a fossil fuel burner.

9. A fuel cell stand-by energy supply system as claimed in claim **2** wherein there is further provided a charger connected to said power supplied by said electrical utility, said charger charging a battery supply for operating said microcontroller and its associated circuitry and switching devices.

10. A fuel cell stand-by energy supply system as claimed in claim **2** wherein there is further provided an auxiliary electrical outlet connector connected to said operating a.c. supply of said voltage conditioning circuit to supply power to other electrically operated devices, and a switch operated by said microcontroller to switch said outlet connector ON and OFF as determined by the available power of said fuel cell d.c. supply feeding said voltage conditioning circuit.

11. A fuel cell stand-by energy supply system as claimed in claim **2** wherein said detection means is a detector circuit associated with said microcontroller, said detector circuit incorporating a time delay circuit and a switching circuit for actuating a main switch after said time delay to connect said device to said voltage conditioning circuit fed by said fuel cell and for operating said fuel cell switch to actuate said voltage conditioning circuit by connecting said fuel cell d.c. supply thereto.

12. A fuel cell stand-by energy supply system as claimed in claim **11** wherein said voltage conditioning circuit is comprised of a current stabilizing circuit connected across said fuel cell d.c. supply and feeding an inverter circuit which converts the d.c. supply of said fuel cell to a 120 volt a.c. supply, and a phase control circuit at an output of said inverter.

13. A fuel cell stand-by energy supply system as claimed in claim **11** wherein said fuel cell d.c. supply is comprised of one or more fuel cells each having an integrated control, said fuel cells being fed by an hydrogen or direct hydrocarbon supply container through suitable valve means.

14. A fuel cell stand-by energy supply system as claimed in claim **2** wherein there is further provided a current and voltage sensor at an outlet of said fuel cell d.c. supply for feeding information signals to said microcontroller, said microcontroller having integration circuit means to calculate the actual power output of said fuel cell d.c. supply at any given moment.

15. A fuel cell stand-by energy supply system as claimed in claim **14** wherein an energy indicating device is fed by said microcontroller to indicate said actual watt-hour of said fuel cell d.c. supply whereby to determine the used and available watt-hour of said supply.

16. A fuel cell stand-by energy supply system as claimed in claim **2** wherein said microcontroller is provided with an autodiagnostic circuit function.

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